PART III

Physical Description

Physical Regions of Washington

On the basis of surface features, Washington may be divided into eight general regions. Agricultural settlement is influenced by factors of topography, climate, soil, forest vegetation and water resources distinctive to each of the physiographic regions. Each has become a different type of farming area as settlers have learned to adapt crops and livestock to the conditions, or have improved limitations through drainage or irrigation.

Coastal Plains

A narrow, sandy plain with shallow bays, tidal flats, stream deltas and low headlands lies between the coastline and the Coast Range. It extends from the Columbia River mouth almost to Cape Flattery, being widest and lowest in the Grays Harbor and Willapa Bay districts. The climate is mild and damp with a long growing season, but it is too cool, cloudy and wet for most crops. Originally this area was covered with heavy forests and much is now covered with woodlands. Lumbering and manufacture of wood products is the main industry. Farming is largely of the livestock and dairying type on low uplands and drained areas in the lower Chehalis River Valley. Cranberry growing is important and well-adapted to numerous, boggy areas in the Grays Harbor and Willapa Bay sections. The shallow bays are also used for oyster culture. Fishing is common in the rivers and coastal banks.

Coast Range

The Coast Range is an uplifted area of sedimentary and metamorphic rocks divided into the Olympic Mountains and the Willapa Hills. The Olympics tower to nearly 8,000 feet in a dome-like structure, carved deeply by rivers. These mountains have the heaviest precipitation in the state. Snowfields and heavy forest cover the mountains. Most of the wilderness area is within the Olympic National Forest and Olympic National Park, being managed for recreation, wildlife and timber. Farm settlement is limited to some foothill river plains and coastal terraces such as the Dungeness and Port Angeles districts along the Strait of Juan De Fuca. Here in the lee of the mountains, rainfall is moderate and irrigation is practiced by some livestock farmers. The Willapa Hills country is wet, heavily forested and carved into numerous narrow valleys. Logging is the main industry, combined with livestock farming in the upper Chehalis River Valley and along the banks of the Columbia River. Wet climate, hilly topography and the difficulty of clearing stump land retards agriculture.

Willamette-Puget Sound Lowland

A broad lowland, described as a trough or valley, lies between the Coast Range and the Cascade Mountains. The northern part is the Puget Sound Lowland which has been glaciated and occupied by the sea in the lowest section. The cintinental glacier reached slightly south of Olympia. Under a warming climate it melted and geologists believe it receded about 25,000 years ago, leaving an infertile plain of moraines and outwash gravels, sands and clays known today

as the Puget Glacial Drift Plain. Its rolling surface has numerous lakes and bogs. Most of the major cities--Seattle, Tacoma, Everett, Bellingham and Olympia--have been built on moraines bordering the Sound. Rivers, such as the Nooksack, Skagit, Snoqualmie, White and Puyallup, built up deltas and flood plains over the older gravelly plains. These narrow valleys are more fertile than the older glacial plains and support numerous small dairy, vegetable and berry farms. Most of the gravelly areas are wooded with a second-growth forest and are used for pastures. In the southern part of the Willamette-Puget Sound Lowland, there are two large valleys--the Cowlitz and Chehalis. They drain a low, hilly area with several flat prairies and bottom lands.

Agriculture is handicapped by poor drainage and flooding of the river deltas and plains, by heavy winter rainfall, by cloudy but dry summers, by coarse, gravelly upland soils and by densely wooded land which is costly to clear. Advantages are mild climate and a location close to major markets for farm products such as milk, poultry and vegetables.

Cascade Mountains

The Cascades are a wide and high topographic and climatic barrier which separates western and eastern Washington. The range is made up of sedimentary, igneous and metamorphic rocks which have been carved by glaciers and streams. High, isolated volcanic cones of lava such as Mt. Adams (12,307 feet), Mt. Rainier (14,408 feet) and Mt. Baker (10,791 feet) appear upon the older Cascade rocks. The Cascade crest varies between 3,000 and 10,000 feet and is higher and more rugged in northern Washington. Roads and railroads have been built across its lower passes in central and southern Washington. The Columbia River has cut a deep gorge and the lowest pass through the barrier. The western slope is wet and heavily forested with Douglas fir. The eastern slope is drier with a less-dense pine forest. Nearly all classified as forest land, most of the area is in Federal ownership in five national forests and Mount Rainier National Park. Tree fruit farming in the eastern slope valleys of Wenatchee, Chelan, Methow, Naches and the Columbia Gorge is most important. Sheep and cattle summer grazing on alpine grasslands is another use. Deep western slope valley bottoms such as the Skagit, Snoqualmie, Nisqually, Cowlitz and Lewis also contain livestock farms. The area is vitally important as a source of timber. Steep terrain, wet climate, short growing seasons and heavy forest vegetation are main handicaps for agriculture.

Columbia Basin

A low plateau of old lava rocks covered with stream and wind-deposited soils extends in a series of plains, ridges, coulees and hills from the Cascades to the eastern Washington border. The area is basin-like in structure, being higher around its margins and sloping inward to low and level central plains. It has been sharply eroded by the Columbia River and its interior tributaries, the Snake, Yakima, Palouse and Spokane Rivers. The basin has sub-areas created by crustal movements and erosion.

The Yakima Folds are a series of hilly ridges extending from the Cascades eastward into the lower part of the basin. The Yakima and Columbia Rivers have cut gaps through the ridges and built up plains in the troughs between them. The rich, alluvial plain of the Yakima River is an important irrigated valley.

The Waterville Plateau is a tableland of thin soils overlaying basaltic rock at an elevation of 2,500 to 3,000 feet. It has gorges cut by the Columbia River and ancient glacial outwash streams once flowing in Moses and Grand Coulees. It is too high for irrigation and is used for dryland grain and livestock farming. The high plain is often called the Big Bend country.

The Channelled Scablands is a belt of dry terrain carved by ice-age rivers into a series of coulees. Bare rock is exposed in the coulees. Small plateaus between the old river channels have thin soils used for dryland farming. The Grand Coulee of this region has been developed into a major irrigation reservoir.

The Palouse Hills consist of fertile deposits of wind-blown soil overlaying basaltic lava flows. After being deposited in large dunes, the formation was reshaped by streams into an intricate pattern of low, rounded hills which are tilled for wheat, barley and legumes. The hills receive 16 to 25 inches of rainfall and have deep, porous and fertile soils. It is one of the richest farming areas of the Pacific Northwest.

The Central Plains are low and relatively level expanses of soil, deposited by old streams crossing the Channelled Scablands and later by the flooding of the Yakima, Columbia, Snake and Walla Walla Rivers. Climate is desert-like (6-12 inches of precipitation per year). The lower lands of the area, the Quincy and Pasco Basins and the Walla Walla Valley, are irrigated. Quincy Basin is a new irrigation area watered by Grand Coulee Dam.

Agricultural handicaps in Columbia Basin regions are mainly found in its dry, continental climate. Large irrigation systems build since 1900 have overcome much of the need for water on rich valley and basin soils. Dryland farming in higher areas is practiced widely, although occasional variations in rainfall, lack of snowfall, winter-kill, water and wind erosion inflict damage to field crops and to livestock ranges.

Okanogan Highlands

A portion of the Rocky Mountains, consisting of well-eroded old granites, lavas and sedimentary rocks, extends across north central Washington. These are the Okanogan Highlands, the state's richest mineral area. Summit levels reach 4,000 to 5,000 feet with peaks exceeding 7,000 feet. Prominent north-south valleys are occupied by irrigated tree fruit and livestock farms. These are the Okanogan, Sanpoil, Kettle and Colville Valleys. The Columbia River Gorge through the Okanogan Highlands is occupied by the large man-made lake behind Grand Coulee Dam--Roosevelt Lake. High and wetter portions are forested with pine and larch, and are managed for timber and for livestock ranges by the United States Forest Service and the Bureau of Indian Affairs. Cold winter temperatures, short growing seasons, dry valley climates and distance from markets are farming handicaps.

Selkirk Mountains

The Selkirks, a range of the Rocky Mountain system, extend into the northeast corner of Washington. The rocks are old mineralized granites and metamorphics reaching elevations of over 7,000 feet. The Pend Oreille River Valley

at the base of the Selkirks is an agricultural area of narrow bottom lands settled by livestock farmers. Nearly all of the uplands are in Kaniksu National Forest. While climate is cool and growing seasons are short, the Pend Oreille Valley has an advantage of being closely located to the Spokane metropolitan market area.

Blue Mountains

The Blue Mountains are an uplifted and eroded plateau extending into the southeastern corner of Washington. The strata are mainly ancient crystalline rocks which contain some minerals. The highest point of the mountains in the Washington section is Diamond Peak (6,401 feet), on the divide between the Grande Ronde, Tucannon and Touchet Rivers. These rivers, and the Walla Walla River, have cut valleys into the plateau. Extensive pine forest and grassland areas are in the highlands within Umatilla National Forest, where rainfall is 30 to 40 inches. The Snake River has cut a deep valley and gorge across the lower parts of the mountains. The area is well developed agriculturally around its northern foothills where wind-blown soils are deep and irrigation systems are used. The Walla Walla and Tucannon Valleys are rich grain, legume and livestock areas grown under irrigation and by dry farming. Grazing is an important use of the high lands by livestock ranchers in the upper valleys.

Topography of Skamania County

Skamania County is entirely within the Cascade Mountain range system and its southern part contains the Columbia River Gorge which cuts across the range. The county is predominantly mountainous with a limited area of river bottom lands and foothills capable of being farmed. Elevations vary from the average flood level of the Columbia River below Bonneville Dam about 30 feet above sea level to the summit of Mount St. Helens of 9,671 feet. There are four general topographic areas within the county.

In agriculture, settlement and cross-state transportation, the Columbia River Gorge is the most important area. The Gorge is a scenic feature resulting from millions of years of erosion by the Columbia River. Geologists believe the Columbia River was a large stream before the Cascade Range was formed. Its erosive force was sufficient to cut and to maintain its bed as the Cascades were slowly thrust upward over a long geological period. Called the "North Bank" in Skamania County, the Gorge is deeply imbedded in the Cascade Range. Narrow terraces and tributary valley plains bordering the Columbia River are farmed. North Bonneville and Stevenson were built on the Columbia River bank. A cross-state railroad and highway follow this gap through the Cascade Mountain barrier. In recent years Bonneville Dam was constructed in the Gorge by the Federal Government to improve navigation on the Columbia River, to generate electrical power and to provide flood control.

The second major area is the higher Cascade Mountain region of northern Skamania County which includes the upper Lewis River basin and the volcanic peaks and beds of Mount St. Helens and a portion of Mount Adams. This is a national forest area used mainly for recreation because of its scenic qualities. Mount St. Helens is a youthful, symmetrical, volcanic peak with a perpetual snow cap. Elevations in this heavily forested and mountainous area range from 2,500 feet in the valley of the Lewis River to 9,671 feet at the peak of St. Helens.

Wind River Valley is an important tributary lowland extending northward from the Columbia River into the higher Cascades. The valley is narrow but contains some crop and pasture land. The village of Carson and a forest tree nursery are located in this district. Work in Gifford Pinchot National Forest and lumbering are main activities for settlers in Wind River Valley.

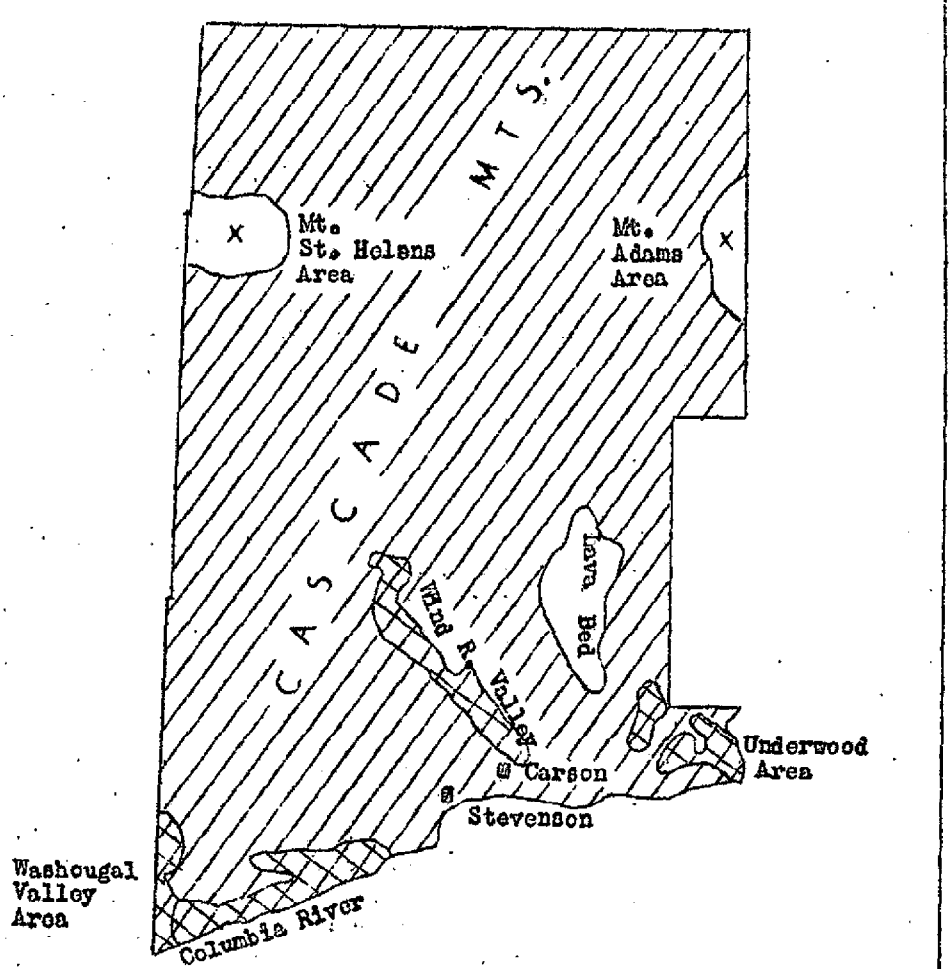
A fourth important area is the lower White Salmon Valley in southeastern Skamania County. White Salmon River forms a boundary with Klickitat County. On the Skamania side, the valley is important for fruit growing and livestock industry. Topography is hilly but accessible and crops and orchards are located in the lowlands adjacent to the river. Underwood is in this area and the trade center is the town of White Salmon, across the river on the Klickitat side of the valley. Most agricultural land in the Underwood district is under 1,000 feet in elevation.

Land Classification and Soils

Skamania County land is broadly divided into seven general classes. Only about 5 percent of the county area is classified as good to fair land for agriculture. About 95 percent is too rough and too high for crop farming and is useful only for forest growth, recreation or grazing. A considerable area of lava flows originating from Mount St. Helens and Mount Adams is barren and ice-covered.

Soil and terrain of fair quality for farming in land classifications of II, III and IV is localized to the lower terraces of the Columbia River gorge, the Wind River Valley, the White Salmon Valley and the upper Washougal Valley. Each of these lowlands has small pockets of level to gently sloping terrain of rich, river deposited soils. These river bottom and lower river bank soils are of the generalized Willamette soil series consisting of silty and sandy loams similar to those found in the Willamette Valley of western Oregon. Some volcanic ash and pumice is intermixed in this soil, having been received by eruptions of such volcanic peaks as Mt. Hood, Mt. St. Helens and Mt. Adams in the central Cascades. Rivers from the volcanic areas have deposited rich volcanic ash on the small river plains. Lower foothills adjoining the bottoms have a soil formed from parent basaltic rock, volcanic ash and decaying forest organic matter. This is the Aiken series of gravelly and sandy loams common to the Cascade foothills. Aiken soils are suitable for orchards, pastures and hay when cleared of dense forest cover. Aiken loam soils are the most common of the Skamania agricultural soils.

Class V, VI and VII land with thin, stony soils make up about 90 percent of the land area of the county. Deep beds of basalt and recent lava flows from Mt. St. Helens and Mt. Adams cover extensive areas. Heavy rainfall and numerous streams have dissected the plateau into numerous V-shaped valleys. An older lava plateau surrounding Mt. Adams is used for sheep grazing but most of northern Skamania County is within Gifford Pinchot National Forest and is classified and zoned for use for timber harvesting on a sustained yield basis and for outdoor recreation. Districts surrounding Mt. St. Helens and Mt. Adams are zoned exclusively for recreational use and secondary use for watersheds and for wildlife management.



Source: Generalized from map, Washington Generalized Classification of Land According to Its Capability for Use. Published by U. S. Soil Conservation Service and Washington State Agricultural Experiment Stations, cooperating. 1949.

CLASS II, III AND IV LAND: Soil and terrain of fair quality for general farming and orchards.

CLASS V, VI AND VII LAND: Hilly and mountainous terrain with poor soils; suited for grazing and forest growth only.

CLASS VIII LAND: High, alpine, barren, rocky areas unsuited for forest growth or grazing.

Figure 6.- General Quality of Land in Skamania County

Climate

Skamania County's climate is of the West Cascade Mountain type, according to the classification of the U. S. Weather Bureau. Situated almost entirely within the Cascade Range, Skamania receives 40 to over 100 inches of precipitation per year. Temperatures, while varying greatly with changes in elevations between valley bottoms and mountain ridges and plateaus, are generally cool and mild. Condensation of westerly winds flowing over the Cascades causes a high degree of cloudiness. The area is on the inland border of the West Coast Marine climatic region which extends along the North American coast from southeastern Alaska to northwestern California. This general climatic region is characterized by short, dry, cool summers and long, cloudy and wet winters with prevailing westerly winds. Skamania County is in a transitional location where the warm, humid marine air masses begin to take on the characteristics of drier, colder continental air masses during the winter season.

Precipitation varies from over 110 inches in the Mt. St. Helens district to 40 to 70 inches along the Columbia River Gorge at the mouth of the White Salmon River. The rapid ascent of humid westerly winds over the higher Cascades in northern Skamania County brings heavy rains and snowfall during autumn, winter and spring. The westerlies flowing eastward through the Columbia River Gorge are not forced upward as high as when going over the Cascade crest and consequently precipitation is considerably less over southern Skamania County. Nevertheless, the Columbia River gap receives precipitation of 40-70 inches annually. June to September is a dry season over most of the county. Collision of marine humid air masses with cold continental air masses in the gorge during the summer and fall, however, contributes to atmospheric instability and there are numerous electrical storms. The Mt. Adams and Mt. St. Helens districts have a high frequency of electrical storms in the summer season, contributing to problems of forest fire control. Lightning strikes ridge tops quite often without any heavy showers to quench fires started in dry timber.

Table 6.- Precipitation for Selected Stations by Months
Skamania County

Station and Elevation in Feet	Average Monthly Precipitation (in inches)												Annual Total (inches)
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
Washougal (760) 1/	16.06	9.02	11.87	2.03	4.37	4.71	1.0	6.39	3.12	11.80	4.65	11.38	85.40
White Salmon (2,020) 2/	9.11	16.5	4.95	.29	1.37	.81	1.0	2.39	.69	3.95	2.03	6.79	59.90
Wind River (1,150)	16.05	12.38	11.15	6.07	3.75	2.53	1.16	1.02	3.02	8.81	14.58	19.09	99.61

1/ White Salmon is in Klickitat County adjacent to Skamania County.
2/ One year record only at Washougal.

Source: U. S. Weather Bureau, Climatological Data, Washington Annual Summary, 1956

Because of elevation changes, temperature conditions vary from locality to locality. Lowlands adjacent to the Columbia River and in the Wind, Washougal and White Salmon Valleys are mild in winter and warm in summer. Winter temperature records from the higher mountains are not available, but general

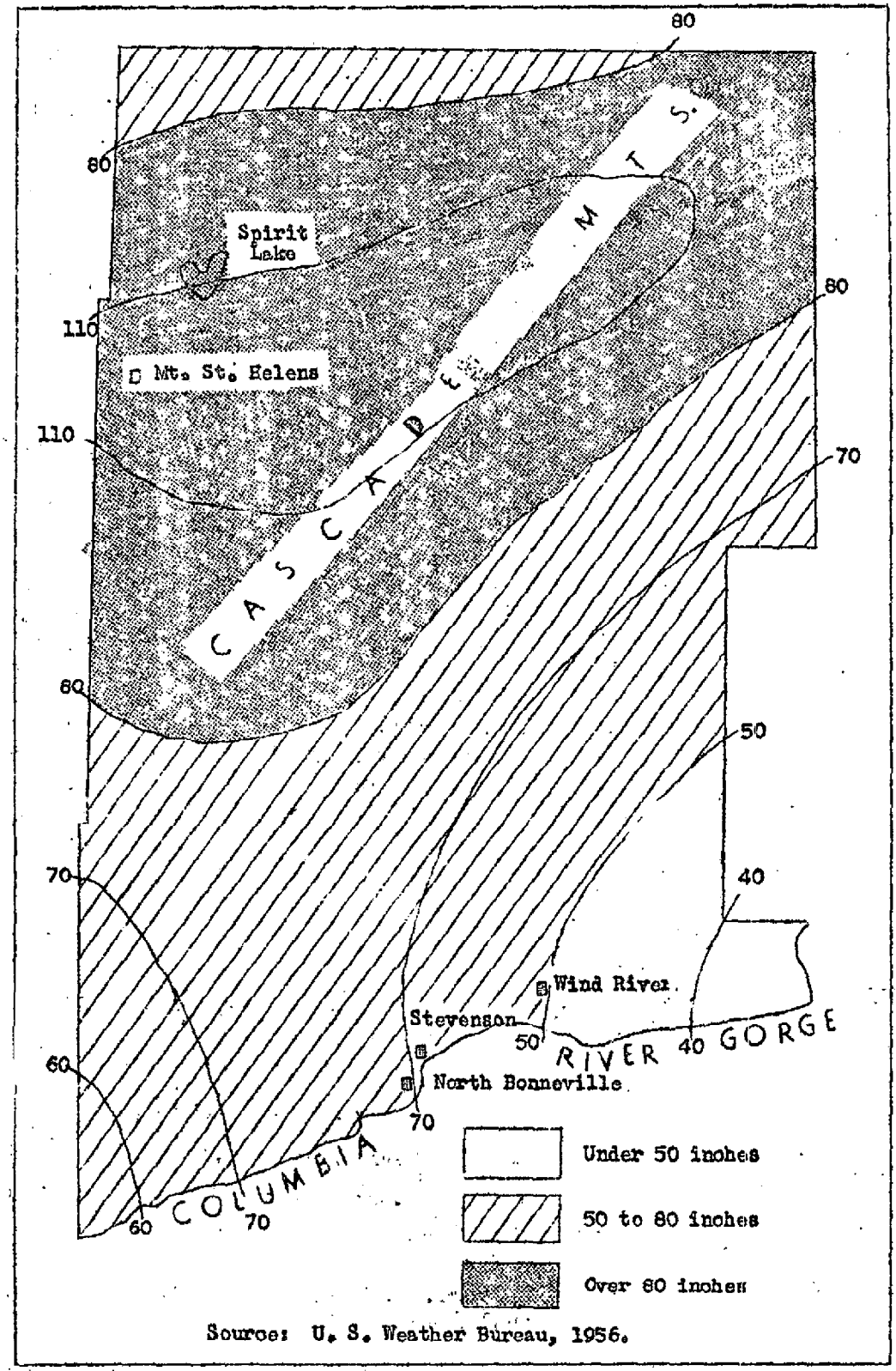


Figure 7.- Distribution of Precipitation
Skamania County

climatological maps place the mountain region within a zone of cold winters and cool summers. A long time record in the Wind River Valley at 1,150 feet shows that in mid-winter the temperature average is a moderate 32 to 35 degrees and in the summer a mild 58 to 63 degrees.

Because of its interior and mountainous location and the air flow characteristics through the Columbia River gap in the Cascades, the area is subject to rather severe temperature extremes. Warm or mild Pacific Ocean air can rapidly be displaced with either extremely cold or extremely hot and dry continental air. Wind River Valley has had extremes of 107 and lows of -13 degrees. Mt. Pleasant in the gorge has had cold extremes of -3 and heat extremes of 101. Growing seasons and frost patterns vary greatly. Wind River Valley has about 140 days of growing season, while Mt. Pleasant and the Washougal Valley have 200 to 225 days. Because of their more interior or continental position, White Salmon Valley and Underwood districts have generally less than 135 days of frost or freeze-free weather. They are also more exposed to cold easterly winds flowing down the Columbia River Gorge.

Table 7.- Temperature Extremes, Dates of Killing Frost
Skamania County

Station and Elevation in Feet	Temperature Extremes Recorded (degrees Fahrenheit)		Killing Frost Average Dates	
	Coldest	Hottest	Last in Spring	First in Fall
Mt. Pleasant (500)	-3	101	April 3	November 10
Washougal (760)	-10	103	April 6	November 19
White Salmon 1/ (2,020)	-16	101	May 12	September 22
Wind River (1,150)	-13	107	May 19	September 30

1/ Located in Klickitat County near Skamania County boundary.

Source: U. S. Weather Bureau

Table 8.- Temperatures For Selected Stations, By Months
Skamania County

Station and Elevation in Feet	Average Temperatures (in degrees Fahrenheit)												Annual Average
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
White Salmon 1/ (2,020)	26.9	25.3	35.3	47.5	55.1	55.0	64.7	62.3	56.9	47.7	37.9	36.2	45.9
Wind River (1,150)	32.2	35.5	40.4	46.8	53.0	57.9	63.0	62.4	58.0	49.7	40.0	35.2	47.8

1/ White Salmon is in Klickitat County near the Skamania boundary.

Source: U. S. Weather Bureau, Washington Climatological Summaries, 1956.

Forest and Wildlife Resources

Skamania County is part of the heavily forested Cascade Mountain range and the timber resource plays a dominant role in the county's economy. Over

63 percent of the county area is within Gifford Pinchot National Forest. Most of the county's residents are supported directly and indirectly by industrial and other types of employment based on forest resources. Many of the part-time farmers are employed in forestry or lumber occupations in state or federal government forest management services and by private logging and lumbering companies. Woodlands are owned and managed by over 125 farmers in the county.

According to a Forest Service survey in 1953, Skamania County contained 1,035,480 acres of forest land, covering 96 percent of the total land area within the county. 1/ Of this forested acreage, 963,000 acres is classified as commercial and 73,000 acres is in noncommercial alpine and barren land. Skamania County has one of the largest reserves of saw timber remaining in the state. In 1953 standing commercial saw timber was estimated at 589,000 acres, covering 55 percent of the total area.

Forests are composed of five major species of commercial timber. Douglas fir, common in the lower elevations, amounts to 15 billion board feet. Pacific Silver fir, a higher elevation timber, is second at 3.5 billion feet. Western hemlock amounts to 4.7 billion; western red cedar, 1.5 billion and western white pine, 588 million board feet. Other important commercial timbers are noble fir, grand fir, alpine fir, red alder and big leaf maple. In 1953 there was an estimated resource of 27,384,000,000 board feet of commercial timbers of all species in Skamania County.

Over 83 percent of Skamania County forest land is in public ownership and about 17 percent is privately owned by companies, individual land owners and farmers. Federally-owned forest land managed in Gifford Pinchot National Forest accounts for 75 percent and amounts to 680,000 acres. The State of Washington owns and manages 69,000 acres of school grant and other state lands. Privately owned forest land covers 159,000 acres. In recent years the federal timber stands in Gifford Pinchot National Forest have been managed for sustained yield harvesting and blocks of timber have been auctioned to private industry in public sales. About 25 percent of the receipts for sales of public timber are returned to the county for school and road funds.

Logging and lumbering was on a minor scale in Skamania County until about 1940. During World War II the county became a major source of saw logs for the lower Columbia River lumber industry. In 1954 Skamania County's log cut from federal, state and private timber holdings was 231,177,600 board feet, ranking fifth among Washington counties. During World War II and years following, lumber manufacturing increased locally within the county. Between 1940 and 1950 lumber manufacturing in Skamania County went from 25 million board feet per year to over 52 million board feet. 2/

1/ U. S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. Portland, Oregon. Forest Statistics for Skamania County, Washington. (Mimeographed) 1953.

2/ West Coast Lumbermen's Association, 1953-1954 Statistical Year Book. 1410 S. W. Morrison St., Portland 5, Oregon.

The mountainous and forested regions of Skamania County attract an important annual tourist trade of persons seeking outdoor recreation. Rural families benefit from this trade. Forest Service records show that over 75,000 persons annually visit or vacation in the scenic recreational areas and camps in the Mt. St. Helens and Mt. Adams districts. According to the Washington State Game Department, Skamania County is an important hunting and fishing area. 1/ State reports show that hunters in a recent season bagged 180 elk and 1,600 deer in this area. Pheasant and grouse hunters bag over 1,000 birds per year. The Game Department annually stocks over ten lakes and fifteen streams in Skamania County for trout fishing. Wild fur resources trapped by farm youth include mink, otter, marten and muskrat.

1/ Wash. State Department of Game. Game Bulletin, Olympia, Wash. These bulletins published quarterly each year give statistics on hunting and fishing by counties.

Table 9.- Skamania County's Rank Compared With Other Washington Counties

Item Compared	Rank	Quantity	Year
General			
Land area	24	1,072,640 acres	1954
Number of farms	39	240 farms	1954
Land in farms--percent	39	2.5 percent	1954
Average size of farms	22	112 acres	1954
Cropland harvested	39	2,705 acres	1954
Rural farm population	39	922 persons	1950
Total county population	35	5,200 persons	1950
Cash farm income			
Value of all farm products sold	37	787,121 dollars	1954
Value of livestock sold	39	207,795 dollars	1954
Value of crops sold	30	449,437 dollars	1954
Livestock on farms			
All cattle and calves	39	2,100	1954
Milk cows	37	510 head	1954
Hogs	35	562 head	1954
Chickens	38	9,891 birds	1954
Horses and mules	37	120 head	1954
Sheep and lambs	36	192 head	1954
Dairy and poultry products sold			
Value of dairy products sold	33	77,408 dollars	1954
Whole milk sold	33	1,616,000 pounds	1954
Value of poultry products sold	35	53,049 dollars	1954
Chickens sold	26	21,055 birds	1954
Eggs sold	35	85,843 dozen	1954
Important crops harvested			
Clover and timothy	31	650 acres	1954
All tree fruits	13	590 acres	1954
Alfalfa	32	330 acres	1954
Pears	5	18,277 trees	1954

Sources: U. S. Census, Agriculture, 1954.
USDA, AMS, Agricultural Estimates Divn.